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## Published

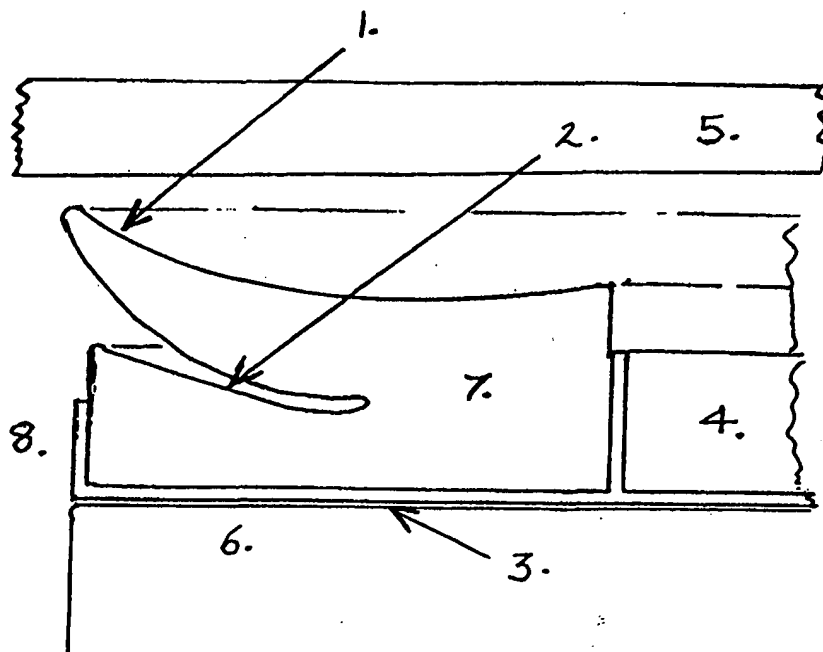
*With international search report.**Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.*

(54) Title: VACUUM FASTENING PAD

## (57) Abstract

A square or rectangular frame of cast or fabricated material (4) is mounted on a support structure (6) with similar frames for appropriate load holding capacity. Each frame has a vacuum inlet within the seal (7) area. A flexible seal (7) of rubber or similar material moulded or extruded into a shape and profile to (7) is secured into the rectangular frame (3). When the object to be fastened to the rectangular frames (5) (a vessel or attachment plate) pushes against the area (1) of the seal (7), it flattens the seal down flat against the area (2) of the seal. The area of seal between 1 and 2 becomes locked together preventing the seal from distorting and maximising grip on the surface (5) when forces are applied in direction (8) on the frames. Vacuum is applied within each rectangular frame pulling the seals into a flat position.

The holding frame with rectangular or square pads attached is capable of holding large objects in place.



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Vacuum Fastening Pad      refer to sheet 7.

A square or rectangular frame of cast or fabricated material (4) is mounted on a support structure (6) with similar frames for appropriate load holding capacity. Each frame has a vacuum inlet within the seal(7) area.

A flexible seal (7) of rubber or similar material moulded or extruded into a shape and profile to (7) in Fig 1 is secured into the rectangular frame (3).

When the object to be fastened to the rectangular frames(5) (a vessel or attachment plate) pushes against the area(1) of the seal(7) it flattens the seal down flat against the area of the seal (2).

The area of seal between 1 and 2 becomes locked together preventing the seal from distorting and maximising grip on the surface (5) when forces are applied in direction (8).on the frames.

Vacuum is applied within each rectangular frame pulling the seals into a flat position.

The holding frame with rectangular or square pads attached is capable of holding large objects in place.

## Claims

1. Vacuum pad shape, configuration and seal design as described (above)
2. Use of pistons (rams) powered by fluid or air to hold a vessel clear of fenders or wharf compensating for forces pushing the ship in or out from fenders or wharf.
3. Use of pistons (rams) powered by fluid or air to...
  - (a) hold a vessel in a fixed position preventing movement in either direction parallel to a wharf or fender system.
  - (b) to move a vessel along a wharf or fender system by a brake or clamping device fastened to the pistons as described.
4. The mounting of the units described on the front edge of a wharf or fender system fixed in place or on a rail
5. The mounting of the units described on the underside of a wharf or fender system fixed in place or on a rail system.
6. The mounting of the units on the deck or within the frame of the vessel with fastening plates mounted with flexible fastening to the wharf or fender system. /i

SHEET 7.

Fig 1.

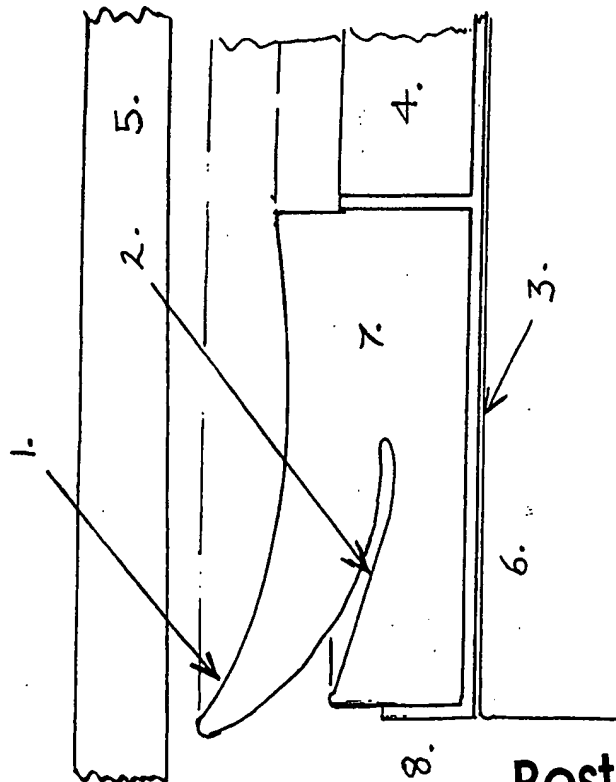
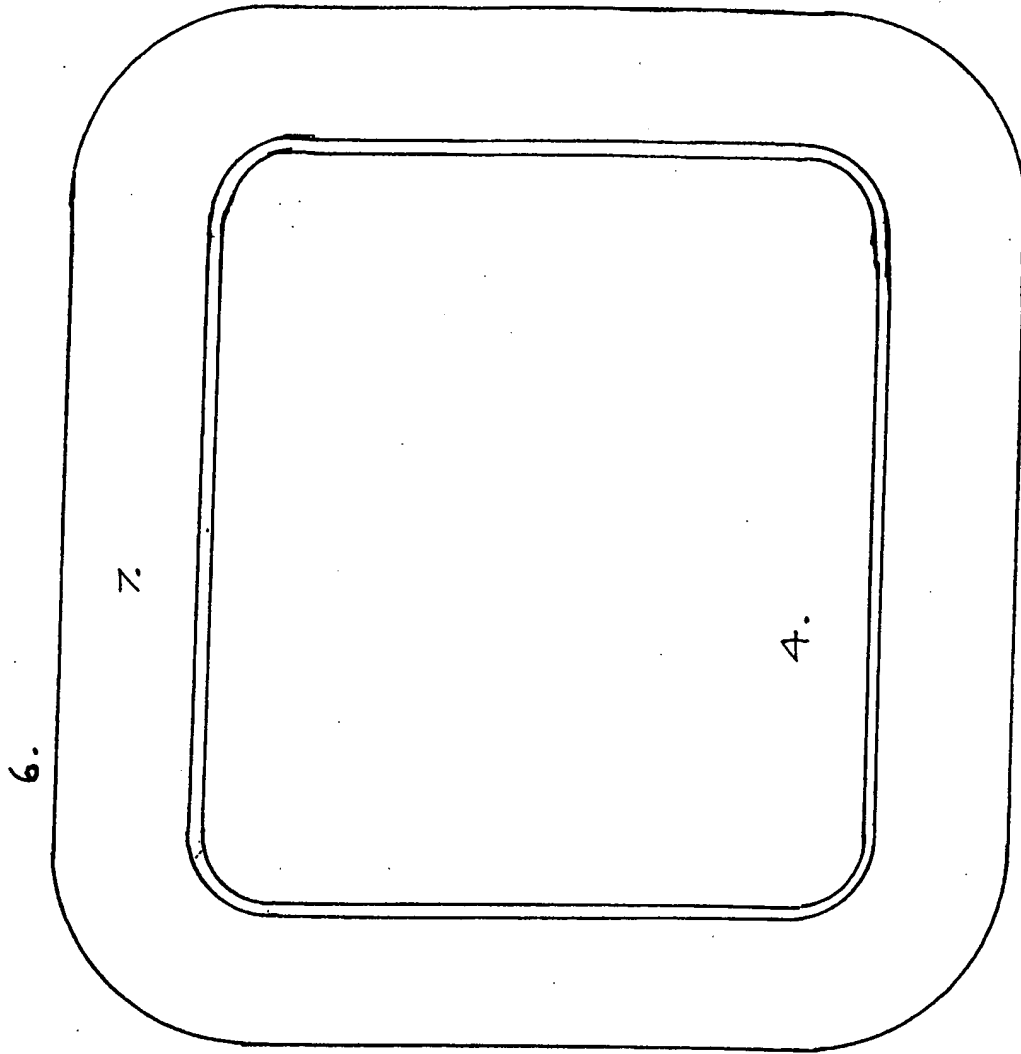


Fig 2.



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A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 E02B3/20 F16B47/00

According to International Patent Classification(IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 E02B F16B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 463 114 A (LOVELL) 26 August 1969 see the whole document ---	1-6
X	US 3 974 794 A (KAKITANI) 17 August 1976 see the whole document ---	1-6
A	PATENT ABSTRACTS OF JAPAN vol. 10, no. 246 (M-510) '2302' , 23 August 1986 & JP 61 075112 A (ISHIKAWAJIMA HARIMA HEAVY IND CO LTD), 17 April 1986, see abstract ---	1-6
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24 February 1998

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 41 18 905 A (ORENSTEIN & KOPPEL AG) 10 December 1992	2,4
A	see the whole document -----	3,5,6
A	US 3 322 091 A (STANWICK) 30 May 1967 see the whole document -----	1

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3463114 A	26-08-69	NONE	
US 3974794 A	17-08-76	JP 1089924 C	23-03-82
		JP 50073396 A	17-06-75
		JP 56030234 B	13-07-81
		AU 498119 B	08-02-79
		AU 7486474 A	06-05-76
		BR 7409240 A	11-05-76
		DE 2451501 A	07-05-75
		DK 572074 A	07-07-75
		FR 2249801 A	30-05-75
		GB 1491511 A	09-11-77
		NL 7414096 A	09-05-75
		SE 7413656 A	07-05-75
US 3626890 A	14-12-71	NONE	
DE 4118905 A	10-12-92	WO 9222710 A	23-12-92
		NO 934447 A	16-12-93
US 3322091 A	30-05-67	NONE	

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